



Northern Spotted Owl Conservation Plan

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A. Introduction and Summary

This northern spotted owl conservation plan provides information about the natural history of the northern spotted owl (*Strix occidentalis caurina*) (NSO), its occurrence in the Plan area, potential effects on the species from activities in the Plan area, the level and location of incidental take for which PALCO is seeking a permit from the U.S. Fish and Wildlife Service (USFWS), and the measures that PALCO will implement to minimize and mitigate the effects of take.

The conservation strategy for the NSO reflects the significant scientific data made available concerning the habitat and biology of the NSO since its listing. The conservation strategy is a "habitat-based" approach which seeks to conserve viable populations of the NSO by insuring that the habitat requirements of the NSO are present throughout the life of the Plan. For example, the HCP includes provisions to insure that adequate nesting, roosting, foraging and dispersal habitat will be present across the Plan Area throughout the life of the Plan. The Plan also provides for the protection of NSO habitat in perpetuity through the establishment of the Headwaters Reserve, and conservation of high quality and developing habitat in Marbled Murrelet Conservation Areas (MMCA's).

The HCP also contains detailed measures to insure that incidental take of NSO will be limited by (1) restricting harvesting to 16 unoccupied sites during the initial five years of the HCP and (2) imposing other restrictions if the estimated NSO population falls below a specified level.

B. Natural History

The northern spotted owl (NSO) is listed as a federally threatened species, and is a Board of Forestry sensitive species pursuant to 14 CCR 895.1. In California, the range of this species is considered the Klamath and Coast Range provinces in northwestern California (Thomas et al. 1990). The species' listed range in California includes the Coast Range north of San Francisco Bay, the Klamath Mountains, and the southern Cascades southeast to the Pit River (USFWS 1990). The specific habitat of this species in the Klamath Province is primarily older coniferous or mixed forest, or younger forest where suitable structural components are present.

Different habitat types used by spotted owls may be related to their nesting, roosting, and foraging habits. A relatively dense forest canopy, open enough to allow flight below the canopy appears to be most commonly used. However, the NSO will use forest with more open structure when suitable foraging opportunities exist for the dusky-footed woodrat (*Neotoma fuscipes*). The dusky-footed woodrat is the primary prey in the region, and occurs in high densities in early seral stage habitats (Zabel et al. 1995, Hamm 1995, Sakai and Noon 1993). NSOs preying on woodrats tend to have smaller home ranges and higher reproductive rates than exhibited by the species elsewhere (Zabel et al. 1995). Spotted owls are perch and drop hunters, and will take food from off vegetation or on the ground. They will also cache excess food. Minimum nesting requirements appear to be some sort of arboreal structure, and the nearby presence of an adequate prey base, including the dusky-footed woodrat and other small to medium sized mammals, especially in some habitats the northern flying squirrel (*Glaucomys sabrinus*). In an analysis of prey items on Pacific Lumber lands, 49.83% of prey biomass was made up of dusky-footed woodrats, and 33.22% of prey biomass was made up of brush rabbits, another species associated with earlier successional habitats (Kerns 1989). This corresponds with results of prey analyses from elsewhere in the redwood region (Simpson Timber Co. 1992, Pious 1989).

The spotted owl does not appear to construct a nest. NSOs in northwestern California nest in cavities in snags or live trees, or in live trees on old nests of squirrels or other large birds, debris platforms, or deformities (La Haye 1988, Folliard 1993, Hunter et al. 1995, Kerns 1989). Other PALCO spotted owl nests have been observed in nests of other species, e.g. abandoned raptor nests, old squirrel nests, "trash piles" made up of accumulated conifer needles on branches, and in constructed nest boxes hung in trees. Two detailed studies have described NSO nesting habitat in the redwood region near the HCP area. NSO nest sites and nest stands were described on Simpson Timber Company lands by Folliard (1993). A residual old growth tree component

was contained in 62% of 60 nest stands described. Sites in forests >60 years old showed somewhat higher reproductive success. The sites sampled had a high degree of canopy closure. Based on the data analyzed, Folliard recommended managing for stands of 44 trees/acre 11"-20" d.b.h. plus 20 trees/acre 20"-35" d.b.h., with clumps of trees >35" d.b.h., with canopy closure >90%, and on the bottom third of the slope. Thome (1997) also studied NSOs on managed timberlands, and reported that nest sites occurred in stands of large trees, and that while reproductive success was correlated with occurrence of the nest sites in certain categories of stands of larger trees, success was lower in the largest, oldest stands present. It was suggested that this was possibly because of effects on nearby habitat due to entry of these older forests for timber harvest, or due to lower prey densities in the older stands. Thome (1997) reported the highest fecundity as related to stands 21-40 years old.

Little is known of the actual habitat requirements for dispersal of NSO. Thomas et al (1990) suggested that a landscape in which 50% of the area was forested in trees of an average d.b.h. of 11 inches, and with a canopy closure of 40% should be adequate to provide dispersal needs. Berbach et al (1994) reported that 75% of the quarter townships in the three coastal California counties of Del Norte, Humboldt, and Mendocino met this standard; thus, dispersal habitat is not believed to be limiting in the coastal region.

For the northern spotted owl, a growing concern regarding habitat competition from other species has spurred research on a closely related member of the genus *Strix*, the barred owl. Historically, barred owls (*Strix varia*) were distributed from the southern states into the northeastern United States. The barred owl has been expanding its range into the northwestern states. The barred owl range expansion in the west has been documented mainly through detections during intensive survey efforts for the northern spotted owl (*Strix occidentalis caurina*), and has revealed a rapid rate of range expansion. Since the first detection of a barred owl in 1981 in California, there have been upwards of 61 barred owl sites reported (Dark et al. 1998). There are 12 known sites where barred owls have apparently established territories on Pacific Lumber Company lands. The social status of these barred owls is unknown, although they appear to be mostly single males. Some of the sites are not well established.

A clear pattern of habitat use of barred owls has not yet been determined in the Pacific northwestern states. Hamer (1988) was the first to study habitat utilization of the barred owl in the west using telemetry. He found that barred owls inhabited disturbed, mixed deciduous-coniferous forests at low elevations. Another study, conducted by Dunbar et al. (1991) in southwestern British Columbia, found that a significant number inhabit old growth and mature coniferous forests. In the Plan Area, barred owls are potentially occupying habitats similar to those used by the northern spotted owl. Barred owl behavior patterns can have negative impacts on the northern spotted owl. The northern spotted owl may be negatively affected by interspecific competition with the barred owl. Nicholls and Fuller (1987) found that barred owls maintain exclusive home ranges. Barred owls have been known to respond aggressively to spotted owl calls, often flying in to confront intruding owls and defend their territory (Dunbar et al. 1991). An increasing number of records indicate that northern spotted owls have been temporarily or permanently displaced from their territories by barred owls (Sharp 1989, Dunbar et al. 1991, Hamer 1988). Barred owls can hybridize with spotted owls. This has been documented in California on a small scale (Gould pers. comm., Hamer et al. 1994). In northern California, a single potential predation incident on a northern spotted owl by a barred owl has been reported (Gould pers. comm.). Research into the habitat and relationships of the barred and spotted owls is continuing.

C. Baseline Condition

In the north coast region the NSO is considered by Harris (1996) to be an uncommon resident and breeder. Population sizes and densities in the region have been described by Gould (1995). There are approximately 2,465 different spotted owl sites based on information in the CDFG Spotted Owl Database. In the Coast Province of Northern California, 67% of 978 known sites are on industrial timberlands with long histories of intensive management prior to the listing of the species. Population densities on PALCO lands have been reported at approximately 10-19 sites per township, among the highest in California (Franklin et al 1990). Long term banding studies have not been conducted on Pacific Lumber's ownership, and because not all sites are checked every year, the status of this population is uncertain. However, since 1990 all proposed Timber Harvest Plans have been surveyed and every known nest site and activity center has been protected from timber harvest under the protections of the US Endangered Species Act and California Forest Practice Rules.

PALCO currently has approximately 147 known sites where a pair nesting, pair non-nesting, pair of unknown status, or a single owl have been located. Information is incomplete on numbers of reproductive sites. Population trends have been estimated by the Simpson Timber Company (1996), which neighbors PALCO lands to a great extent, based on the banding of 795 NSOs during the years 1990-1995. The value of "lambda" was not significantly different from 1.0 in the period 1990 through 1994, indicating that the population was near the point of stability. Recalculation following the 1995 season resulted in a somewhat lower value for "lambda", indicating a declining trend over the period. This resulted from low adult survivorship in the severe winter of 1994-1995, low reproduction in the spring of 1995, and dispersal of juveniles outside the study area. Three of the last four years have had wet winters, and in some cases wet springs, which can make for poor breeding conditions for spotted owls. These conditions may have contributed to the decline in lambda, however, the decline may be overestimated because the estimate of juvenile survival has not been adjusted for those individuals which disperse from the study area. It is assumed that the juveniles did not survive, although they may have successfully dispersed outside of the study area (Simpson 1997). Therefore, caution should be used in expanding demographic conclusions to other areas, or in other years (USDA, USDI 1994).

According to Gould (1995), the Northwest Forest Plan includes protection of approximately 823 NSO sites in northern California. Eighty percent of these protected sites are in late-successional reserves and thirteen percent are on congressionally withdrawn lands. Additionally, northern California spotted owl HCP's should protect 57 sites, 194 sites are protected under no take requirements (currently including PALCO), management by parks and conservation groups protect approximately 82 sites, and another five sites are protected in municipal watershed supply areas (Gould 1995).

The primary conservation effort for the NSO occurs on public lands but this HCP has been designed to complement conservation on the Federal lands. The Northwest Forest Plan established a system of Late Successional Reserves (LSRs) that are intended to provide habitat for the species in the long term (USDA and USDI 1994). This and earlier long-term strategies (Thomas et al. 1990, USFWS 1992) recognized that the species' numbers may continue to decline until habitat in reserves stabilizes and begins to increase. The US Fish and Wildlife Service determined that implementation of the Northwest Forest Plan strategy would not jeopardize the continued existence of the species (USFWS 1993).

The Northwest Forest Plan estimated that there were about 1.3 million acres of NSO habitat on Federal lands in California (USDA and USDI 1994). More recently, Federal biologists have revised that estimate to about 1.9 million acres (USFWS unpublished data). In the California portion of the owl's range, the present condition of the LSRs varies widely as a result of natural conditions and timber harvest; but those LSRs closest to the Pacific Lumber ownership (on the Six Rivers and Shasta-Trinity National Forests) are in relatively good condition (USFWS unpublished data).

Several studies have reported apparent continued declines in NSO populations. Burnham et al.

(1994) reported that populations of resident territorial females on 11 demographic study areas throughout the owl's range were declining at a significant rate. As stated above, this trend was not unexpected given extensive habitat loss in recent decades (USDA and USDI 1994). In northwestern California, two demographic studies have been conducted. Franklin et al. (1996) and Franklin (1997) reported that a population mostly on Federal land in Humboldt and Trinity Counties was apparently stable or declining slightly. Little habitat removal had occurred in that study area in recent years, and the most important variable affecting population stability was weather.

Surveys for NSOs on the PALCO ownership began in 1988, and have continued each year since (Kerns 1988). In 1988 approximately 38,000 acres of the ownership was surveyed using methodology described in the Spotted Owl Inventory and Monitoring Handbook (USDA Forest Service 1988), a precursor of the protocol currently in use. Approximately 23 NSO activity centers were located during the 1988 survey season. Habitat evaluation was conducted at the activity centers using available stand inventory information, and by measuring other habitat variables such as downed logs and slope aspect. The surveys conducted in 1988 were able to locate NSOs in old growth, residual, and second growth forests.

In 1989 a five part study was initiated (Kerns 1989a and 1989b). The study consisted of: 1) Timber stand plots to analyze habitat; 2) Pre-breeding season spot checks of activity centers to determine presence; 3) Checking activity centers for nesting at the start of the breeding season; 4) Collection of owl pellets for dietary analysis; and 5) Capture and fitting of NSOs with radio transmitters for a radio telemetry study. This study continued to provide important information on habitat use, nest structure types, and prey species composition. The important role of the early successional species dusky-footed woodrats and brush rabbits (*Sylvilagus bachmani*) as prey species of the NSO became apparent. In a prey analysis done on PALCO lands woodrats comprised 49.83% of the prey item biomass, and brush rabbits 33.22% (Kerns 1989). By the end of the 1989 season it was estimated that approximately 35,000 to 45,000 acres of PALCO lands had been surveyed, and 26 activity centers identified.

The 1990 field season was used to continue gathering NSO information (Kerns 1991). Five objectives for continuing investigations were outlined: 1) Continue gathering information on habitat use of managed stands; 2) Attempt to estimate NSO home range size from the radio telemetry data; 3) Determine if the NSOs would use artificial nest structures; 4) Attempt to investigate the impact of select silvicultural systems on NSO behavior; and 5) Determine nesting success in various stand types. By the end of the 1990 season approximately 41 activity centers had been located. Although the radio telemetry study experienced problems with transmitter failure, many points were collected on two NSOs. From these data points, using minimum convex polygon home range methods, it was estimated that NSOs on PALCO lands probably had a home range of approximately 1,000 acres. Research conducted since that time on home range size of NSOs indicates that this figure is a reasonable estimate of home range size in the redwood region where the dusky-footed woodrat is the primary prey (e.g. Zabel et al. 1995, Zabel pers.comm. 1996).

The NSO was federally listed as threatened in June of 1990. A protocol for surveying for NSOs was endorsed by the U.S. Fish and Wildlife Service in March of 1991. This protocol, "Protocol for Surveying Proposed Management Activities That May Impact Northern Spotted Owls" as revised March 17, 1992 is still widely used today as a guideline for conducting surveys for this species. With the listing of the NSO, in order to comply with the "no take" standard, much of the approximately 200,000 acres of PALCO property was surveyed for NSOs in conjunction with the timber harvest planning process. Approximately 100 survey transects, consisting of from one to several calling points were established and surveyed. From 1992 to 1996 the number of transects and calling points varied with the amount of habitat surveyed for timber harvest planning purposes. Table 1 summarizes the yearly totals of NSOs located.

Also in 1991 PALCO began discussions with the USFWS regarding the development of a "no take" management plan for NSOs which combined surveys with habitat management guidelines. This management plan received concurrence from the USFWS in the fall of 1992, and was used as a management guide for the years 1993 to 1995. A revised management plan was submitted

and received concurrence in the winter of 1996. As part of the management plan individual NSOs were color banded during the field season for individual recognition and to detect movements across the landscape. The color bands are still a valuable tool for recognizing individual NSOs, and have helped us to understand NSO site fidelity and mate fidelity, or the lack thereof.

TABLE 1							
Northern Spotted Owl Yearly Summary							
	1991	1992	1993	1994	1995	1996	1997
Non-nesting pairs	6	13	21	33	45	35	40
Nesting Pairs	24	37	10	27	16	21	43
Pair Status Unknown	18	7	5	25	28	47	33
Known Juveniles Produced	21	18	11	35	21	38	40
Single Males	*	3	12	17	11	13	27
Single Females	*	3	7	8	3	5	4
Total Number of Pairs	48	57	38	85	89	103	116
Total Number of Owls	133	138	106	230	213	262	303
* In 1991 singles were not summarized by sex; 16 singles were observed.							
Note: In all years the amount of habitat surveyed was determined by timber harvest planning.							

In order to model habitat distribution through time for this plan, a cross walk was developed from PALCO's timber typing to California Wildlife Habitat Relationships System (CWHR) using information from habitat analyses, and experience with NSOs on the PALCO ownership. The CWHR Version 5.2 Database Spotted Owl Habitat Matrix was used to rank NSO nesting habitat. CWHR considers habitat suitability ratings to be a qualitative probability of occurrence specific to a given habitat type and stage. High, Medium, and Low ratings are defined in the CWHR Training Manual (Garrison 1995) as follows:

- **HIGH:** Habitat is optimal for species occurrence and can support relatively high population densities at high frequencies.
- **MEDIUM:** Habitat is suitable for species occurrence and can support relatively moderate population densities at moderate frequencies.
- **LOW:** Habitat is marginal for species occurrence and can support relatively low population densities at low frequencies.

Other habitat was typed as non-habitat, foraging, or roosting. For more information, see Volume III, Part B.

D. Activities with Potential for Impacts

Covered Activities with the potential for impacts to NSOs include: Timber Management, Road Construction, and Scientific Surveys and Studies. Several aspects of Timber Management, i.e. logging operations have the potential for direct and indirect impacts to this species. For example, timber harvest may alter or remove nesting habitat. Although it is unlikely that a species capable of strong, maneuverable flight within the forest canopy such as the NSO could be struck by a falling tree, it is difficult to rule out. Juveniles incapable of flight could be hit by logging debris, for example. Disturbance of nest sites may occur during timber harvest or road construction or maintenance. A female attending a nest could be driven off, causing mortality to eggs or nestlings. Direct impact of these types will be avoided or minimized through specific mitigations. Habitat modification can include modification of nesting, foraging, or dispersal habitat. Scientific surveys and monitoring are listed as an activity with the potential for impacts because there is increasing concern that "over surveying" in some areas of the bio-region has caused NSOs to stop responding to calls, increasing the chance that they will not be detected by

surveys. Additionally, repeated human activity near nest and roost sites may lead to the attraction of nest predators such as ravens, which are known to take eggs or juveniles. Other potential impacts considered include factors which were cited by the Service at the time the NSO was listed: the potential effects of forest fragmentation; the loss of management options; possible increases in predation and competition; and the added risk of harm due to natural occurrences.

E. Incidental Take

PALCO is seeking an incidental take permit (ITP) from USFWS that will cover the harvesting of 16 known inactive owl sites and impacts to NSO habitat from the Covered Activities not including the harvesting of active nests or the harvesting of more than 16 inactive nests during the first five years of the Plan. Because the sites are inactive, no direct harm to NSOs is expected. However, authorization for take is required under current Forest Practice Rules and USFWS policies. The 16 sites "taken" under the plan will be chosen from among the 20 inactive NSO sites in the plan area. Table 2 identifies the 20 inactive sites; see Volume 5 for map. After the first five years of the Plan, all incidental take resulting from the Covered Activities will be authorized, subject to the limitations described below in the minimization and mitigation measures.

The sites identified in Table 2 were established prior to 1998 due to nighttime audio contacts of a NSO single or pair, or daytime follow-up location of a NSO single or pair, where a "mousing" may have occurred. ("Mousing" is an attempt to determine breeding status and location by feeding the spotted owl(s) mice and observing their behavior and movements once they have captured the offered mouse.) In the case of the nighttime contacts, which are promptly followed up with no daytime response, it is likely that the night contacts indicated owls foraging some distance away from their day roosts or nests. The sites listed will be prioritized for "take" beginning with those which have not been occupied for three years, then two years, and so on. These locations will continue to be monitored in 1998, and following years, during the first five years of the ITP in order to check for occupancy. If one or more of the sites on this list is again found to be occupied before the site is modified, another unoccupied site may be chosen to be "taken" in consultation with the USFWS.

1. Owl Site #8

A male NSO was contacted here first in 1993 on the fourth survey of seven conducted on the survey transect. The stations were surveyed again in 1994. There were two contacts, one was a female NSO and another was a male. An unbanded male NSO was moused on the southwest side of an intervening ridge, whereas the contacts were centered on the northeast side. The site was determined to be an activity center per the USFWS protocol as a result of the number of contacts in the area and the mousing. The stations were surveyed again in 1995. There were no contacts. The activity center was visited and a male was found and moused on 6/19/95. Pair status was not determined. The area was not surveyed in 1996. One visit to the activity center was conducted on 8/8/96. A pair was located and moused. The area was surveyed one time in 1997 with no contact, and the activity center was visited with no contact. However, it should be noted that a subadult male was found less than a half mile away.

2. Owl Site #18

A male subadult was located in this area on 4/28/93. Three more visits were done to try and determine pair status, with no further contacts. The area was surveyed one time in 1994 with no contact. The site was not monitored in 1995 or 1996. The area was surveyed in 1997. A male NSO was contacted on the sixth survey visit and a male was moused on 4/24/97. Another status visit was conducted with no contact and three additional surveys were done with no contact. Finally, in August, a pair was moused at this site and the bands were resighted. It turns out that

they were a pair from an adjacent site using this site as an alternate roost. The site appears to be occupied in 1998 by a new, unbanded pair.

3. Owl Site #21

This site was consistently occupied from 1992 through 1995. The site was visited in 1996, but was occupied by the banded pair from site 17 on three visits. There were no other contacts in the vicinity.

4. Owl Site #22

A NSO was contacted at this location in 1995. A single, unbanded male was found at this location. We were able to distinguish that this was not the banded male from a nearby nesting pair, moused on the same day. This area has been called three times each year since 1995 with no further contacts, other than the pair at the nearby site.

5. Owl Site #25

A pair consistently occupied this activity center until 1995. In 1995, a barred owl pair established an activity center in the same drainage. In 1996, the NSO pair was resighted a mile away to the north. The site was not monitored in 1996. Six survey visits were done in 1997 with no contacts. The original NSO pair was found in 1996 and 1997 1 mile north of site #25.

6. Owl Site #54

A pair was moused at this activity center in 1995. The site was visited twice in August of 1996. Surveys were conducted six times in the area in 1997 with no contacts. The area has been surveyed twice, and the activity center intensively searched twice in 1998 with no responses.

7. Owl Site #56

This activity center was occupied previously by a banded NSO pair. In 1994, the pair split and the female from another site in the vicinity (137) replaced the female from site 56. The location of the original female at site 56 remains unknown. In 1996, the pair was resighted occupying site 56. Then, in 1997, the pair set up a new activity center closer to activity center 137, where they nested. We continued to monitor site 56 and had no responses. This year, the owls were found at the same nest tree (site 137). We are continuing to survey in the area of site 56.

8. Owl Site #63

This activity center had been occupied by a pair originally banded in 1988. Every year the site has been monitored. The last time an owl was moused at this site was in 1996. A male was contacted and moused. There were no contacts at this site in 1997. The area was surveyed three times with no contacts. The activity center was intensively searched four times with no contacts. The remains of the banded female NSO were found on the first visit to the activity center in 1998. The area has been surveyed once this year as well, with no contacts.

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TABLE 2
Potential Inactive NSO Sites

Site #				Legal Location						Year					
GIS#	HU#	Transect	Site Name	T	R	Sec.	1/4	1/16	1/64	1993	1994	1995	1996	1997	1998
8	708	CH-7	NF Elk North	4N	2E	30	NE	NW	NW	M	PU	M	PU	NC	UNK
18	804	CH-7	Turkey Foot East	3N	2E	5	NW	NW	NE	M	NM	NM	NM	NC	PU
21	709	C-9	The Pass	3N	2E	6	SE	NW	NW	PN	PNN	PN	NC	NC	UNK
22	806	H-2	Upper Booth's Run	3N	2E	10	NW	NE	SE	NC	NC	M	NC	NC	UNK
25	225	E-2	Gas Wells	3N	1W	22	NE	NE	SE	PN	PN	PU	NM	NC	UNK
54	618	L-10	Above Scotia	1N	1E	8	SE	SE	SE	NC	NC	PU	NM	NC	UNK
56	534	K-2	Shale Pit	1N	1W	14	NE	SE	NW	PU	PNN	PNN	PU	NC	UNK
63	164	M-11	Twin Creek	1N	1E	28	SE	NW	SW	PU	PU	PU	M	NC	NC
86	715	N-3	Pepperwood	1N	2E	30	SW	SE		M	M	PN	NM	NC	UNK
89	612	O-2	Upper Smith Crk	1N	3E	32	NE	SW	SW	M	PU	PNN	M	NC	UNK
104	814	OP-4	Newman North	1S	2E	24	SE	NW	SE	PU	PU	PU	M	NC	M
106	168	P-3	Newman South	1S	2E	25	NE	NE		PU	PU	PNN	NC	NC	UNK
107	595	Q-2	Pipeline Crk	1S	3E	31	NW	NE	SE	PN	PNN	PNN	NM	NC	UNK
129	826	H-8	Shaw Crk North	3N	2E	21	NE	NW	NW	NM	NM	NM	PU	NC	UNK
900	156	I-8	None	1N	2E	1	SW	SW	NC	NC	F(A)	NC	NC	NC	UNK
901	617	L-2	None	1N	2E	18	SE	NW	NC	NC	NC	NC	M	NC	NC
903	630	H-34	None	2N	2E	5	NW	SW	PN	NC	NC	P(A)	NC	NC	UNK
904	630	H-34	None	3N	2E	33	SW	SW	NM	NM	NC	P(A)	NC	NC	UNK
906	614	LJ-8	None	2N	2E	23	SW	SW	NM	NM	NC	NC	F(A)	NC	UNK
907	643	C-13	None	4N	1E	27	SE	NE	NM	NM	NC	NC	M	NC	UNK
Site Codes NM Not Monitored A Audio contact only P Pair NC No contact PN Pair nesting M Male PU Pair, nesting status unknown F Female PNN Pair, not nesting UNK Unknown 1998															

9. Owl Site #86

A nesting pair was located at this site in 1995. The nest failed. We banded the male in 1995 at the nest location. A female was found after the nest failure a ridge over to the southeast and was banded on that visit. On the next visit to the area, the male and female were located together a half mile away from the nest location. This newly established activity area was assigned a new site number (90). The nest site (86) was monitored in 1997 by surveying the area three times and intensively searching the activity center twice.

10.Owl Site #89

A male NSO was first found at this activity center in 1993. In 1994 and 1995, a pair occupied this site. Only a male was located here in 1996. The activity area was surveyed three times and intensively searched twice in 1997 with no contacts. A male NSO was contacted and resighted this year. The status is yet to be determined, but it appears the activity center may be occupied.

11.Owl Site #104

A pair was first located at this site in 1995. The area was surveyed three times with one NSO contact. Three intensive searches of the site were conducted in 1996 with no contact. The area was surveyed again in 1997 with no contact. The activity center was searched once as well with no contact. There has been one contact in 1998. There was no response on the follow-up.

12.Owl Site #106

A pair had occupied this site up until 1996. The area was surveyed and searched in 1996 and 1997 with no contacts.

13.Owl Site #107

A pair occupied this site up until 1997. The area was surveyed and searched in 1997 with no contacts. The remains of the banded female from this site were found. The male was not contacted.

14.Owl Site #129

A pair was moused here in 1996. The owl bands were not established. This site lies within a half mile of another site. It is possible this was an alternate roost for this pair, as there have been no further contacts at this location.

15.Owl Site #900

A female NSO was contacted one time in 1994 after midnight, on the third visit. Two known activity centers lie within a half mile of this contact. Because of the late nature of this contact it was considered as a foraging contact. The contact was given a site number when a NSO consultation was submitted to CDFG for a THP. The area was surveyed in 1995, 1996, and 1997 with no NSO response.

16.Owl Site #901

A banded male from site 156 was located just over a half mile from the activity center in 1996. The owl was roosting near his previous mate, who was determined to be paired with a new male at site 79. We assigned the male from site 156 a temporary site number for 1996 in case he established a new activity center at this location. In 1997, the male from site 156 was found back at site 156 once again paired with the female and nesting. The area of 'site 901' was monitored with no contact.

17.Owl Sites #903 and #904

An NSO pair was contacted on multiple surveys in this vicinity in 1995. Four follow-ups were done in attempt to find an activity center. On the fourth visit, a banded male was located roosting at one of the survey contact locations. It was determined by band that this male was from an activity center just over the ridge to the west approximately one half mile away (Owl Site #34). We determined that the contacts were associated with the nesting pair from activity center #34.

18.Owl Site #906

A female NSO was contacted on the second survey of a station in 1996. Three additional surveys were conducted in the attempt to determine if there was an activity center. Three follow-ups were also done with no response. The area was surveyed in 1997 three times with no responses. A harvest plan in the area was submitted for consultation with CDFG in 1996 and the contact location was assigned a site number to monitor it in 1997.

19.Owl Site #907

A male NSO was contacted at this location in 1996. Although they exhibited some nesting behavior, they did not nest, and the male continued to roost separately from the female. We assigned the roost site a temporary number for accounting purposes. Standard protection measures were applied for this site. In 1997, the site was surveyed with no contact.

F. Minimization and Mitigation Measures

The impacts of taking will be minimized and mitigated by providing nesting, roosting, and foraging habitat for NSOs throughout the plan period, by protecting all known active nest sites for the first five years of the plan, and by reducing the likelihood that nesting owls will be disturbed during timber harvest and other activities.

Maintenance of habitat diversity over time will maintain nesting, roosting, and foraging habitat, and at least 10% of the forested landscape within WAAs will be maintained as suitable NSO nesting habitat. This 10% standard may include High, Medium, and Low Suitability Ratings. However, objectives for LTSY projections includes maintenance of at least 10% Late Seral (CWHR 5M, 5D, or 6). This means that at least 10% nesting habitat will consist of that with a CWHR Suitability Rating of High for redwood types, High for Douglas-fir types, and Medium to High for Montane-Hardwood Conifer types (MHC 5M has a Moderate Suitability Rating). Table 3 indicates the projected acres of NSO habitat in the Plan Area over the LTSY period; Figures 1-7 show the projection by WAA.

The Headwaters Reserve contains approximately 3,000 acres of high quality nesting habitat, as well as other foraging habitat which will develop into nesting habitat during the life of the permit.

Timber stands totaling approximately 8,535 acres set aside as Marbled Murrelet Conservation Areas currently contain 16 known sites historically or currently occupied by NSOs. Except for possible thinning designed to enhance development of late successional habitat, these stands will be left unharvested for the plan period.

Timber stands developed in riparian protection zones for fish-bearing and non-fish-bearing streams are expected to eventually provide about 27,951 acres of nesting habitat distributed across the ownership (Summary, Table 2). The basal area and large tree retention measures provided in riparian zones will meet or exceed those reported as NSO habitat management goals by researchers in the redwood region. As stated earlier, Folliard (1993) recommended managing for stands of 44 trees/acre 11"-20" dbh plus 20 trees/acre 20"-35" dbh with clumps of trees >35" dbh with canopy closure of >35" on the bottom one-third of the slope. Thome (1997) found the greatest nesting success in stands >100 sq. feet basal area. PALCO's riparian prescriptions will provide a 100 foot wide buffer on each side of Class II (non-fishbearing) watercourses (10' LMZ and 90' RMZ) with > 240 sq. feet of basal area and approximately 12 trees per acre over 32" d.b.h.; and a 170-foot wide buffer on each side of Class I (fishbearing) watercourses (30' LMZ, 70' RMZ with 300 basal area per sq. ft. and approximately 12 trees per acre over 36" d.b.h., and 70' RMZ with 240 basal area per sq. ft. and approximately 12 trees per acre over 32" d.b.h.). In addition, retention of snags and green culls during timber harvest should provide residual structure that may provide nest structures in younger stands.

Foraging habitat is expected to be extensive, as younger redwood stands 10-30 years old are known to produce large numbers of woodrats (Hamm 1993). At least 5% of the property is expected to be young forest at all times, and is predicted to average approximately 28% (Volume III, Part C, Predicted Northern Spotted Owl Habitat). Additionally, NSOs forage in habitats used for nesting and roosting. These habitat types combined are not predicted to be less than 76% of the PALCO lands during the Plan period (Volume III, Part C, Predicted Northern Spotted Owl Habitat). Dispersal habitat and corridors for juveniles and floaters will be maintained through these young forest types and the riparian management zones.

During the first five years of plan implementation, only 16 inactive NSO sites with low or no history of reproduction will be harvested. During this period, sampling will determine an estimated baseline population on the ownership. Following determination of the baseline population numbers during the first five years of the plan, NSO sites will be displaced by timber harvest, and the population may decline, but is expected to fluctuate in approximate proportion to available habitat. At the end of the plan period, between approximately 178,865 and 185,877 acres of NSO habitat will be extant (Volume III, Part C, Predicted Northern Spotted Owl Habitat). If numbers of NSO pairs were proportional to nesting habitat, at the low point for nesting habitat (at the end of the first SYP period) approximately 93 pairs would be expected to have their nesting habitat needs met. Following this low point in total nesting habitat, the predicted acres of total nesting habitat continues to increase through the Plan period. Although the mid and low quality nesting, roosting, and foraging habitats are predicted to fluctuate through the Plan period in response to harvest and regrowth, the high quality nesting habitat remains at or above approximately 21%.

Throughout the plan period, NSO population numbers will be tracked by repeated censusing. Should owl populations fall below 67% of the baseline level for three consecutive years, PALCO will meet with USFWS to develop a "no take" management strategy, and that strategy will be used until the population estimate is above 67% of the baseline level for three consecutive years. The actual baseline level is currently unknown, but based on an estimated baseline of 150 pairs, this strategy should provide for a "floor" of at least 100 sites occupied by pairs at all times.

1. Habitat Retention

Throughout the plan period, at least 10% of the forested landscape within WAAs will be suitable nesting habitat for NSOs. The amount of habitat will be determined using the cross walk between timber types and the CWHR Version 5.2 matrix for spotted owl habitat discussed above. (Although there have been more recent versions of CWHR produced, for example version 6.0, there have been no changes in the habitat matrix which would effect the application of the crosswalk).

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TABLE 3 Projected NSO Habitat in the Plan Area over the LTSY Period													
NSO Habitat Type	Decade												
	0	1	2	3	4	5	6	7	8	9	10	11	12
High Quality Nesting	80,318	58,646	43,489	55,792	60,970	51,383	55,539	62,807	60,518	83,891	70,182	56,313	77,733
Medium Quality Nesting	10,627	14,723	1,919	717	4,616	1,955	5,210	1,341	811	1,679	3,112	7,078	753
Low Quality Nesting	70,211	56,333	99,131	96,574	89,420	105,116	100,741	98,844	108,714	76,294	92,864	103,694	84,506
Roosting	10,764	26,096	9,446	15,583	6,233	11,074	20,730	17,177	6,881	12,168	2,662	6,643	10,665
Foraging	18,070	14,699	9,936	256	63	9,337	3,657	3,416	6,311	1,344	100	4,321	3,658
TOTAL NSO Habitat	189,990	170,496	163,920	168,922	161,302	178,865	185,877	183,585	183,235	175,376	168,921	178,048	177,315

FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

FIGURE 5

FIGURE 6

FIGURE 7

Also, the MMCAs will be conserved throughout the Plan period. The Headwaters Reserve will be preserved through the Plan period and beyond.

2. Surveys

1. For active operations between February 15 and March 15, the THP area and a 1,000' buffer will be surveyed, with one visit between February 15 and March 1 or later if necessary, and two visits between March 1 and March 15, or later if necessary.
2. For new operations initiated between March 15 and August 31, the THP area and a 1,000' buffer will be surveyed. Two survey visits will occur prior to the start of operations but after March 1.
3. Nesting status of owls will be determined within 48 hours for all contacts made during surveys whenever feasible. Operations will continue while status is being determined. If felling or yarding crews locate spotted owls, operations will cease until nesting status can be determined.
4. Surveys will not be required for activities other than timber harvest or for salvage logging done under a salvage exemption to the FPRs.

3. Protection of Activity Centers

An activity center is the area including the primary roost tree of a non-nesting pair or single, or the nest tree of a nesting pair. Measures to protect these sites will be as follows:

1. In areas where the NSO status has been determined to be nesting; or until a wildlife biologist determines that nesting has failed, or that young are capable of avoiding direct impact of timber harvest:
 - a) No harvesting will occur during the breeding season (March 1 to August 31) within a 1,000' radius of the nest tree.
 - b) If status is determined to be a non-nesting pair or single owl, 18 acres around the activity center (the area equivalent to a 500' radius circle) will be protected. The protected 18 acres will conform to natural landscape features as laid out by PALCO's wildlife biologist, and the protected activity center must be at least 400' wide.
2. During the first five years of Plan implementation:
 - a) One activity center per pair will be maintained (except for those unoccupied sites which are taken);
 - b) All 1997 activity centers will be maintained (except for those unoccupied sites which are taken), unless a new activity center is located within 0.5 mile.
 - c) All new pair activity centers will be maintained unless (in a subsequent season) a new activity center is located within 0.5 mile.
 - d) During the breeding season, the 1,000' radius zones will be maintained around all pairs unless a non-nesting or single status is confirmed.
 - e) Outside the breeding season, 18 acres (the area equivalent to a 500' radius circle) around each pair activity center will be protected. The protected 18 acres will conform to natural landscape features as laid out by PALCO's wildlife biologist, and the protected activity center must be at least 400' wide.

3. Road construction, blasting, and other loud equipment noises (such as chainsaws, excavators, and loaders) will not occur in activity center protection zones during the breeding season.
4. Exceptions to the above restrictions may be approved following consultation with USFWS.
4. Monitoring
 1. The amount of spotted owl habitat in the Plan Area will be updated annually, and recalculated following vegetation inventories.
 2. Each survey season, PALCO shall employ a method of estimating the baseline spotted owl population in the Plan Area. For this estimate, PALCO proposes to modify the sampling scheme as described in Azuma, et al (1990) "Estimating the Occupancy of Spotted Owl Habitat Areas by Sampling and Adjusting for Bias". Those owls contacted during sampling surveys will be visited to determine nesting status. For those owls determined to have a nesting status, reproductive status (number of young produced) will be determined. The nesting and reproductive status information will be reported and compared to regional results in the annual report (#5 below).
 3. The average of the results of the first five survey years will be used to establish a total baseline population estimate.
 4. Following the first five years and the establishment of the baseline population estimate, PALCO will survey a sample area each year and compare results to the baseline.
 - a) If the population is estimated to be greater than 75% of the baseline, the measures described above will be continued.
 - b) If the population estimates fall below 75% of the baseline for three consecutive years, PALCO will convene with USFWS and evaluate reasons for the decline and means for managing the spotted owl population.
 - c) If the population estimate falls below 67% of the baseline estimate for three consecutive years, PALCO will meet with USFWS to develop a "no take" management strategy and that strategy will be used until the population estimate is above 67% for three consecutive years.
 5. Annual reports will be provided to USFWS regarding implementation of the spotted owl measures.

G. Potential Impacts of the Taking

Because a population of NSOs similar to that which is known to occur today in the bioregion was in existence at the time of listing, it is apparent that the species has persisted through times of intensive timber management. It is expected that the impacts of this Plan are not likely to be greater than previous timber management impacts in the region. Although the Plan proposes that approximately 33% of the estimated population may be "taken" prior to the implementation of a "no take" strategy, it is highly probable that the proposed measures to avoid direct take and monitor the population and habitat of this species make it unlikely that worst case estimates of take will be reached. The potential "floor" of approximately 100 NSO pair sites, maintained in a matrix of suitable nesting habitat interconnected with dispersal habitat, is similar to previous strategies proposed to maintain viable populations of this species (Thomas et al 1990). Because federal lands in the California Coast province may be insufficient to support viable owl populations, the draft NSO Recovery Plan recommended maintaining three clusters of 20 NSO pairs each in southern Humboldt and Mendocino Counties (USDI 1992). This Plan proposes to maintain habitat for at least 2/3 of the existing population on PALCO lands, which would far exceed the draft recovery goal for southern Humboldt County. It is estimated that there are approximately 70 NSO activity centers within one mile of the PALCO ownership (Gould, pers. comm.). It is possible that, through modification of NSO habitat near ownership boundaries

some of these activity centers could be “taken” during the life of the permit. The same take minimization measures to be applied to owls sites on PALCO will be used to minimize take of those known sites adjacent to property boundaries. Also, this incidental take is expected to be a temporary situation, as habitat will continue to grow and be harvested through time. The incidental take which may occur as a result of this plan will not appreciably reduce the likelihood of the species’ survival and recovery in the wild.

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Part
D

Aquatic Species Conservation Plan